

CLAIMS

306 13 A battery separator consisting essentially of a nonwoven fabric having a substantially unilayered structure, wherein an apparent total surface area of fibers per a surface density of said nonwoven fabric is $20 \text{ m}^2/\text{m}^2$ or more, a thickness of said nonwoven fabric is 0.1 mm or less, a uniformity index of said nonwoven fabric is 0.15 or less, and said nonwoven fabric contains fine fibers having a fiber diameter of $4 \text{ }\mu\text{m}$ or less.

2. The battery separator according to claim 1, wherein the nonwoven fabric consists essentially of non-fibrillated fibers.

3. The battery separator according to claim 1, wherein the fine fibers are formed from island components remaining after removing a sea component from islands-in-sea type composite fibers.

4. The battery separator according to claim 1, wherein the nonwoven fabric contains high-modulus fibers having a Young's modulus of 50 cN/dtex or more.

5. The battery separator according to claim 1, wherein the nonwoven fabric contains fusible fibers.

6. The battery separator according to claim 1, wherein the nonwoven fabric contains the fine fibers, high-modulus fibers and fusible fibers.

7. The battery separator according to claim 6, wherein a combination ratio of the fine fibers : the high-modulus fibers : the fusible fibers in terms of mass is 10 to 40 : 15 to 40 : 20 to 75.

8. The battery separator according to claim 4, 6, or 7, wherein an average fiber diameter of the high-modulus fibers is 5 times or more an average fiber diameter of the

fine fibers.

9. The battery separator according to claim 4, 6, or 7, wherein an average fiber length of the high-modulus fibers is 2.5 times or more an average fiber length of the fine fibers.

10. The battery separator according to claim 1, wherein the nonwoven fabric consists essentially of polyolefin-based fibers.

11. The battery separator according to claim 1, wherein the fibers forming the nonwoven fabric are fixed substantially only by fusing the fibers to each other.

12. The battery separator according to claim 1, wherein a maximum pore size in the nonwoven fabric is 40 μ m or less.

13. The battery separator according to claim 1, wherein a void rate of the nonwoven fabric is 45 to 65 %.

14. The battery separator according to claim 1, wherein a tensile strength of the nonwoven fabric in at least one direction is 20 N/5cm width or more.

15. The battery separator according to claim 1, wherein the nonwoven fabric is subjected to a treatment for imparting a hydrophilic property, selected from a group consisting of a sulfonating treatment, a treatment with fluorine gas, a graft polymerization treatment with vinyl monomers, and a discharging treatment.

16. The battery separator according to claim 1, wherein surfaces of the fibers forming the nonwoven fabric consist essentially of a polypropylene resin.